REMARKS

Favorable reconsideration and allowance of the claims of the present application are respectfully requested.

Imprimis, Applicants' representative gratefully acknowledges the courtesy extended by the Examiner during the interview of this case on June 16, 2009.

In regard to this response: Applicants hereby cancel all previously pending claims and substitute therefor new Claims 66-72.

Obviousness Rejections of Record as Pertains to the New Claims:

All previously pending claims are rejected under 35 USC 103 as obvious over the core combination of Kmecak with Williams further with Corella. The Myers and Carr references are separately added for specific features.

The new claims presented are firmly believed to define a non-obvious, patentable riser reactor in view of the foregoing.

Turning first to the references.

Kmecak:

The Official Action cites to Kmecak EP 0171460. Applicants note that pages 30 and 39 are missing from the EP reference provided, and apparently from other available EP versions. Applicants provide herewith by IDS a copy of what is believed to be the Canadian counterpart to Kmecak in all respects, CA 1265464, containing said pages, which counterpart was hand delivered at the interview aforesaid. Also provided herewith by IDS are US 4435279 and US 4434044, cited at Kmecak at page 39.

Substantively, Kmecak discloses at Figure 8 and related text, a riser reactor

having an upper portion of expanded diameter. The figure is not stated as being to scale. Kmecak refers at page 39 to US'044 and US'279 for certain other apparatus details, including Figure V of the former discussed therein at column 12, line 30 et seq.

In evaluating these discloses, one can conclude, *pro arguendo*, that the Kmecak reactor has a riser portion 1, with a frusto-conical shaped connection leading to expanded diameter portion 2. By all accounts, this portion 2 opens directly, without any change, into the surrounding vessel (generally 12 and 13) in an "upwardly flowing trajectory" (Kmecak, page 42).

New Claim 66, on the other hand, describes a riser reactor characterized by a pre-lift zone, a first reaction zone, a first conjunct section, a second reaction zone, a second conjunct section, and an outlet zone. The three zones of the reactor claimed are each reaction zones. The first zone is configured to provide a reaction time of "0.8 to 1.5 seconds." The second zone provides a reaction time "longer than" the first. And the third, i.e. the outlet zone, is "configured to provide an outlet zone reaction time of 0.5 to 0.8 seconds."

In relation to Claim 66, Kmecak:

1. does not disclose three reaction zones;
2. it does not disclose a second conjunct section wherein the vertical isotrapezia base angle is about 45° to about 85°; and
3. it does not disclose that it is configured in height and diameter to provide the reaction times expressly claimed.

Digressing momentarily to Claim 66 and its recitation that certain zones are

configured by diameter and height to provide the reaction times: these parameters, as couched in the context of the totality of the claims, are not process parameters. They, instead, define structure. Accordingly, they should be given consideration and weight in assessing patentability of the reactor to which they pertain.

The Official Action cites MPEP 2114 in relation to now-cancelled Claim 64 which provided a bare reactor "residence time." While not acquiescing to the official position on erstwhile Claim 64, the instant recitations are clearly differentiate. They require the height and diameter of the respective zones be configured, within the other structural parameters given, to provide certain reaction times. These features are not to be looked at in isolation; they stand as part of the entire structural agglomeration. Claim 66 specifies the total height of the reactor ("about 10m to about 60m"). It also specifies the total reaction time ("2 to 30 seconds"), which correlates to throughput, and in the eyes of the artisan, again relates to size. Within this overarching framework, ranges for height and diameter are recited for the constituent zones. Thus, all the structural boundaries of the riser are firmly set, including throughput. The artisan working within the framework of Claim 66 having all this information would readily understand the subset wording "configured to provide..." as defining yet further structure.

The case law cited in MPEP 2114 is distinguishable and not controlling of the present instance. In re Schreiber 44 USPQ2d 1429 (CAFC 1997) relates to anticipation and inherent functional characteristics in that context. In re Swinehart 169 USPQ 226 (CCPA 1971) relates to definiteness of description and inherent properties. In re Danly 120 USPQ 528 (CCPA 1959) objected to operational language in an apparatus that was stated as a bare possibility ("alternating current may be passed..."). Hewlett-Packard v. B&L 15 USPQ2d 1525 (CAFC 1990) rejected an argument that one need ascribe operational differences to structural ones. Ex

Parte Masham 2 USPQ2d 1647 (BPA&I 1987) claimed a mixing device with the limitation that the mixing means be "completely submerged" when material to be mixed was added: a clear instance of pure operational instruction, and not defining structure. The other citations in MPEP 2114 are inapposite.

On the other hand, Applicants submit the following case law militates persuasively in favor of deeming the subject language as definitive of structural limitations capable of being relied upon to distinguish the art. See e.g. In re Benson, 164 USPQ 22 (CCPA 1969) claims to an outer clutch member required, *inter alia*, a surface of "circular configuration for frictional centering engagement." This language to configuration was found to distinguish the art. In ZMI Corp. v. Cardiac Resuscitator Corp., 6 USPQ2d 1557 (CAFC 1988) claims to an electrode structure, wherein the claimed device had a limitation to reduce pain through the transmission of low current density, were in issue, and recognized in the prosecution history as distinguishing the art. See also Intel Corp. v. U.S. Int'l Trade Comm., 20 USPQ2d 1161 (CAFC 1991) wherein the court construed presumably functional language in an apparatus claim as possessing the capability of performing a recited function. See also RACC Indus. v. Stun-Tech, 49 USPQ2d 1793 (CAFC 1998).

Given the foregoing understanding in the art, and the law, Applicants submit that "configured to provide" the stated reaction times translates directly into language wherein heights and diameters ensue and that these features should therefore be given pith and moment when assessing the art.

Kmecak + Williams + Corella

The three features aforesaid missing in Kmecak are not found in either Williams

or Corolla.

Williams discloses multiple increasing reactor diameters (four are illustrated) the last of which discharges to a cyclone separator 13 with catalyst particles going downward and vapor upward (to element 37). Imposing this onto Kmecak does not prefigure the apparatus claimed. First, it would not lead to a second conjunct section whose vertical base angle is "about 45° to about 85°." Quite the opposite: each frusto-conical section of Williams has the narrow neck down and the larger neck up, connecting each section of increased diameter. The second conjunct section is effectively the reverse of this (see e.g. angle β, Figure 1, which relates to the base angle language aforesaid.). Consistently, the outlet zone of the riser of Claim 66 is of diameter either smaller than or equal to the second reaction zone. Williams, instead, teaches that each succeeding zone be of larger diameter. Hence one combining Williams with Kmecak does not suggest the riser claimed.

Adding Corolla to the mix does not bring the combination closer. Indeed, Corella is a Pyrex laboratory contactor having silica-alumina filled into it such that the bed extends into the upper section of increased cross area. As seen in Figure 3 of Corella, it does not have a second conjunct section, it does not have a third reaction zone (outlet zone) nor does it harken to configurations of height and diameter and the related structural reaction times.

Claim 66 is respectfully submitted to be patentably distinct over Kmecak + Williams + Corella for at least these reasons. Applicants refer to extrinsic secondary considerations already of record that evidence the non-obviousness of the apparatus now claimed.

Myers and/or Carr

As to the other references cited by the Official Action: Myers teaches an apparatus separating catalyst particles, an embodiment of which employs a conical neck. In reading Myers, it appears that riser tube 10, on which the conical neck is attached, can be either of uniform diameter or tapered diameter. This is unlike the riser claimed, which is not of uniform diameter, and not of tapered diameter but just the opposite: second reaction zone is of larger diameter than the first reaction zone. Myers at column 3 lines 30-45. Then Myers teaches an abrupt lateral diversion of the gas stream at the outlet of the riser (column 4 lines 20-30).

There is no motivation to put this type of constrictor on Kmecak, or to consider this to be equatable to the "outlet zone" of Claim 66. First, Kmecak spews its catalyst-vapor exhaust upward, into plenum 13; see *supra*. And it would appear that increasing the speed at which this occurs ala Myers would abrade the inner wall of the surrounding vessel as well as pulverize the catalyst particles one seeks to recover.

Carr is cited for introducing the catalyst at various locations. An examination of Carr shows that this 1972 employs vertical standpipes along the curved length of a reactor. It does not show feed locations along the vertical length of a riser reactor, as claimed (note the language in Claim 66 "in order from the reactor bottom"). This is manifestly different from the teachings of Carr, which in any event does not ameliorate the deficiencies in the principal combination as before elucidated.

It is respectfully submitted that Claim 66 defines a new and non-obvious advance in the art that is being commercially employed with wide success and unexpectedly superior results as elaborated upon elsewhere in the record.

Support for preamble limitation in Claim 66 "about 10m to about 60m" and "2 to 30 seconds" is found at original Claim 2 and page 8, lines 7-8 of the application.

Support for the first reaction zone configuration leading to a time of "0.8 to 1.5 seconds" derives from Examples 2 (0.8 seconds, see Table 5) and Example 4 (1.5 seconds, see Table 8).

Support for the second reaction zone having a longer reaction time than the first zone is from the examples, see e.g. immediately above tables.

Support for the outlet zone configuration leading to a time of "0.5 to 0.8 seconds" is from Example 1 (0.5 seconds, see Table 3) and Example 2 *supra*.

A reactor specifically designed to obtain these reaction times in the context of the other parameters of height, diameter and structure, is unknown to the art. The advantages obtained by the device claimed befit patentability.

Claim 67:

This claim depends from Claim 1 and requires a "horizontal tube" connect the outlet zone to the disengager. This feature is absent from the art cited, and is not ascertainable thereform. It is submitted to be a novel and patentable feature in and of itself to Claim 66.

Claims 68 and 69:

The specific angles and ratios are not found in the references of record. And it is respectfully submitted that they are not mere optimizations. First, if they were, there would be ample art to support this notion. Second, in the totality of Claim 66 from which they depend,

there is no suggestion that these particular measurements in this particular apparatus context, i.e. with all of the limitations in Claim 66, are routine. Third, the evidence of record rebuts any obviousness in this regard.

Claim 70:

Applicants submit that new Claim 70 is directed to a feature of the present apparatus that merits separate consideration in regard to patentability. Claim 70 depends from Claim 66 and requires that the first conjunct section further comprise "a catalyst inlet." Support is at page 5 lines 25-27 of the specification. This feature is not found in the art of record, and itself represents an unusual departure from the art. That is, the placement of a "catalyst inlet" proximate the midpoint of a riser where the diameter enlarges, and between two recognizably distinct reaction zones, is atypical. The art invariably places the catalyst inlet near the bottom of the reactor. This includes the art of record.

Kmecak injects catalyst via line 3 (Figure 8) which is at the very lower end of the riser. The only inlets near the midpoint and/or the enlarged diameter zone are for oil feed or steam diluent. See Kmecak at page 44. This holds true also for US '044 and US '279 referred to by Kmecak. Williams, at the figure, shows the catalyst inlet at lines 6 and 21 controlled by feeder valves 7 and 22. Column 2, line 66 to column 3 line 5, and column 5 lines 19-23 clearly state the catalyst inlets are at the "lowermost" portions. Corella appears to merely pour its catalyst into the contactor. Myers is silent. And Carr drops vertical standpipes into a curved riser of steady diameter, which does not in any way objectively suggest a catalyst inlet at a first conjunct section of specific angularity between two reaction zones of different diameter.

Indeed, the artisan reading this art, and otherwise versed in same, would know

that not all inlets are the same; and would not conclude that an oil feed or diluent inlet (e.g. Kmecak) would suggest a catalyst inlet, which is an entirely different element than these others. Applicants attach herewith a copy of pages 214-225, with figure 7-2, of the well known "Fluid Catalytic Cracking Handbook." These pages unambiguously demonstrate that a catalyst inlet and the considerations for it, are wholly distinct from and not suggested by a raw material inlet, such as a feed or diluent inlet. Among other important structural differences are inlet diameter, which for a catalyst inlet is typically on the order similar to that of the riser diameter, and far greater than that for a raw material inlet; direction of opening, corresponding parts and valving, speed of flow.

In terms of the present invention, this location for a catalyst inlet permits flexible modulation and adjustment of the second reaction zone temperature, and also facilitates proper catalyst concentration for said zone which in turn helps control product selectivity, as discussed previously on the record.

Thus on an objective basis, the placement of a catalyst inlet at the first conjunct section, and the differences inhering in the fact that this is indeed a catalyst inlet, is a substantial variance from the art. It is a nonobvious and patentable change from the normal catalyst practices.

Claim 71:

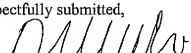
This claim requires a quenching inlet at the second conjunct section. This configuration is not shown in the art of record, the closest of which in this regard purports to be Myers. The conical section in Myers has no inlets whatsoever, let alone a quench inlet. Indeed, it would seem inimical to put a quench inlet at this point in Myers insofar as catalyst separation is

imminent and exposure to a quench would be seen as unnecessary, if not detrimental. Support is at page 5 lines 24-25.

Conclusion:

It is firmly believed that new Claim 66, and with particularity, new Claim 70, each delimit distinct and patentable differences from the art. That these are not routine variations, or mere optimization, but instead represent a careful and deliberate riser design having unexpected benefits and success heretofore not envisioned by the art. Applicants respectfully request passage of the instant application to allowance. Should the examiner have any questions, comments or thoughts on the matters herein, she is urged to contact the undersigned at the telephone number listed.

Respectfully submitted,



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